



OFFICE OF NAVAL RESEARCH  
PUBLICATION/PATENTS/PRESENTATION/HONORS REPORT  
for

1 Oct. 92 through 30 Sept. 93

R&T Number: 93-1341  
Contract/Grant Number: N00014-93-1-0665

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Contract/Grant Title: Growth and Characterization of III-V  
Semiconductors with Rare Earth Impurities for Optoelectronic Devices

Principal Investigator: Robert M. Kolbas  
Mailing Address: Dept. Electrical and Computer Engineering  
Box 7911  
North Carolina State University  
Raleigh, NC 27695-7911

Phone Number: (919) 515-5257  
Fax Number: (919) 515-3027  
E-Mail Address: kolbas@eos.ncsu.edu

- a. Number of Papers Submitted to Referred Journals but not yet published: \_\_1\_\_  
b. Number of Papers Published in Referred Journals: \_\_1\_\_  
(list attached)  
c. Number of Books or Chapters Submitted but not yet published: \_\_\_\_  
d. Number of Books or Chapters Published: \_\_\_\_  
(list attached)  
e. Number of Printed Technical Reports & Non-Referred Papers: \_\_\_\_  
(list attached)  
f. Number of Patents Filed: \_\_\_\_  
g. Number of Patents Granted: \_\_\_\_  
(list attached)  
h. Number of Invited Presentations at Workshops or Prof. Societies Meetings: \_\_\_\_  
i. Number of Presentations at Workshop or Prof. Society Meetings: \_\_2\_\_  
j. Honors/Awards/Prizes for Contract/Grant Employees:  
(list attached, this might include Scientific Soc. Awards/Offices, Promotions, Faculty  
Award/Offices etc.)  
k. Total number of Graduate Students and Post-Docs Supported at least 25%, this year on  
this contract, grant:

Grad Students \_\_1\_\_ Post-Docs: \_\_1\_\_

Grad Student Female: \_\_\_\_  
Grad Student Minority: \_\_1\_\_  
Grad Student Asian e/n: \_\_\_\_  
Post-Doc Female: \_\_1\_\_  
Post-Doc Minority: \_\_\_\_  
Post-Doc Asian e/n: \_\_1\_\_

(See note on next page regarding student and post-doc support.)

94-05021



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## Publications and Presentations:

"Molecular Beam Epitaxial Growth and Optical Characterization of Erbium Doped GaAs/AlGaAs Heterostructures," T. Zhang, D. Zhang, F. E. Reed, N. V. Edwards, D. E. Moxey, R. M. Kolbas, and P. J. Caldwell, Presented at the 1993 Electronic Materials Conference, Santa Barbara, CA. Also, to be submitted to the J. Electronic Materials.

"Photoluminescence Study of Energy Transfer Processes in Erbium Doped  $\text{Al}_x\text{Ga}_{1-x}\text{As}$  Grown by MBE," T. Zhang, J. Sun, N. V. Edwards, D. E. Moxey, R. M. Kolbas and P. J. Caldwell, Materials Research Society Meeting, San Francisco, Spring 1993; Also, Materials Research Society Symp. Proc. Vol. 301, "Rare Earth Doped Semiconductors," G. S. Pomrenke, P. B. Klein, D. W. Langer, Editors, pp. 257-262 (Proceedings of Material Research Society, Pittsburgh, PA 1993).

As you already know there was a fire in a laboratory adjacent to my laboratory in May 1993. Although there was no heat damage to my laboratory or equipment, there was extensive smoke damage to the equipment and facility. The equipment has been cleaned and placed in storage because there is no available space to relocate the Molecular Beam Epitaxy Machine. The entire facility is scheduled to be on line by September 1994, with the possibility that the MBE facility may be able to come up sooner.

During the interim we have focused on evaluating the old samples by SIMS and implantation and have been able to obtain GaN:Er doped samples. This has been possible through an interaction with John Zavada from the Army Research Office (and Bob Wilson, Hughes). The Ph.D. student working on this program is currently being paid through a fellowship rather than ONR funds. The post doc, paid for by Dr. Zavada, contributes to this program by evaluating Er in GaN. The expenditure of funds at the expected rate will be possible as the MBE facility is brought back on line.

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Justification	
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